

REMARKS

Claims 1-15 are pending and stand rejected. Claims 1, 11 and 13 have been amended. Each of these claims, 1, 11 and 13, have been amended to render the claims more definite so that proper §112 support is present. Applicants respectfully submit that these claim amendments result in the pending claims being in condition for allowance.

Applicants thank the Examiner for the reconsideration of the finality of the previous Office Action.

A brief summary of the claimed invention is warranted. Applicants disclose and claim that a *physical catalyst* in a chemical reaction system can be *augmented* by the exposure of the reaction system to *at least one determined frequency*. However, the claims recite not just any frequency, but rather, a very specific frequency (or combination of frequencies). The specific frequency (or combination of frequencies) to which the reaction system is exposed can, for example, *correspond to at least one frequency that is characteristic of the catalyst*—that is to say, corresponding to the catalyst's emission or absorption spectrum. In other words, catalysis is frequency specific, and the *frequencies desired to augment the functioning of a physical catalyst are those that are related to the emission/absorption spectrum of the physical catalyst in the reaction system*.

§102 (b) REJECTION—TSUTSUI

§102(e) REJECTION—MOHR

§103(a) REJECTION—LICHTIN IN VIEW OF TSUTSUI

§103(a) REJECTION—PRATT IN VIEW OF VLADIMIROV AND CRONHEIM

Various of the claims were rejected at pages 2-10 of the Action under §102/103 over the references identified above herein. Applicants respectfully submit that addition of the language in the preamble of each of claims 1 and 13 render the claims more definite under §112. Further, as a natural consequence of the claims being more definite, each of the art rejections become moot.

New §112 Rejections

Claims 11 and 15 were rejected under 35 USC §112. Applicants provide the following remarks. Claim 11 has been editorially amended. The amendment renders moot the §112 position

stated in the Action. With regard to claim 15, Applicants direct the attention of the Examiner to page 16, line 30 – page 17, line 8, reproduced below for the convenience of the Examiner.

“Finally, it is possible to catalyze reactions by duplicating one or more of the mechanisms of action of the exact frequency, rather than using the exact frequency itself. For example, platinum catalyzes the formation of water from hydrogen and oxygen, in part, by energizing the hydroxyl radical at its frequency of roughly 1,060 THz. The reaction can also be catalyzed by energizing the hydroxy radical with its microwave frequency, thereby duplicating platinum’s mechanism of action.”

Applicants respectfully submit the meaning of “copying” the mechanism of action is clear from the disclosure.

Claims 1-6, 9, 10 and 12-14 stand rejected under § 112. This rejection appears to refer to certain claims in error. Applicants respectfully request clarification and reconsideration of this rejection. Applicants believe that the amendments to Claim 1, render claim 1 and the claims dependent thereon, patentable. Further, with regard to the concern on copying “at least one mechanism of action of a physical catalyst”, Applicants direct the attention of the Examiner to page 16, line 30 – Page 17, line 8, above herein.

Claims 13 and 15 also stand rejected under § 112. Applicants direct the attention of the Examiner to page 16, line 30 – page 17, line 8, above herein.

§ 102 (b) REJECTION—BORSUB, ET AL.

Claims 1-4, 7-9 and 13 were rejected under 35 USC § 102 (b) as being clearly anticipated by Borsub, et al. Applicants respectfully traverse this rejection. Specifically, at best, Borsub discloses, irradiation of an inactive transition-metal complex which generates an active thermal catalyst (i.e., a photogenerated catalyst).

Specifically, Applicants direct the attention of the Examiner to page 4827, column 2, lines 25-28 and 39-42, which state:

“The observation that ϕ greatly exceeds unity constitutes prima facie evidence that *the irradiation of 1 [the transition-metal complex] generates an active thermal catalyst* for the isomerization of Q [quadricyclene reactant] to NBD [norbornadiene product]. ... Regardless of the exact details of this latter process, the quantum yield

results require that the *photogenerated catalyst* convert a large number of Q molecules to NBD prior to being deactivated (reaction 4a).” (Emphasis added.)

The spectral pattern of an inactive or “deactivated” catalyst is used to produce a photogenerated, active thermal catalyst. The addition of 313 nm light causes 50% isomerization of Q in 5 minutes (p 4827, col 1, ln 13-16 and Figure 2.). Without light, there is only about a 1% decline in Q levels after one hour, which is the result of an unknown change that occurs upon the mixing of 1 and Q that is not accelerated by light. However, Applicants point the attention of the Examiner to p. 4827, second column, the section entitled (c)Thermal Studies” lines 7-10 and 18-20, which state:

“Some interaction between 1 and Q occurs as evidenced by changes in the electronic absorption spectrum over a period of several hours following the mixing of the two components. ... While we are uncertain as to the origin of the spectral change that occurs upon mixing 1 and Q, it is important to note that this change is *not accelerated by light*.” (Emphasis added.)

It is further stated in the same column:

“Thus, it can be concluded that either (i) the thermal and photochemical isomerization reactions of Q proceed by different mechanisms or (ii) the spectral change arises from a competing thermal process that is unrelated to isomerization.” (Emphasis added).

It is clear that the first product the Action refers to is unrelated to the isomerization product. Accordingly, this reference is deficient in that it does not disclose all elements in the amended claims.

§102 (b) REJECTION—BISCAR, ET AL.

Claims 1, 3-8 and 10-14 stand rejected as being clearly anticipated by Biscar, et al. (1975).

This reference is deficient in that it does not disclose all features in the amended claims. Specifically, Biscar, et al. disclose that the activity of the enzyme α -chymotrypsin increased after irradiation in the 8500-8600 Å range, with a peak at 8,550 Å.

“The activity of the enzyme is unaffected by exciting lines outside the 8500-8600 Å range. Inside this region however, as clearly shown by the data of Figure 9, α-chymotrypsin displays a very sharp activity increase with the peak at 8550 Å, where the activity is more than doubled.” (p 133, col 1, ln 2-7)

Radiation of 8550 Å wavelength is a harmonic of an EMER-Raman spectroscopy wavenumber for chain B of α-chymotrypsin.

“This wavelength corresponds to the harmonic three of the fundamental frequency (3900 cm⁻¹) of chain B *measured by EMER-Raman spectroscopy* and reported above.” (p 133, col 1, ln 7-10, emphasis added).

EMER-Raman spectroscopy, however, does not produce the spectral pattern of a physical catalyst (e.g., it does not produce one or more electromagnetic frequencies emitted or absorbed after excitation of an atom or molecule). In EMER-Raman spectroscopy, the enzyme is subjected to laser irradiation (i.e., a “laser shot”) which changes the spectral pattern of the enzyme.

“If one simply mixes the molecules in the buffer, what is seen is a background from 3700 cm⁻¹ to 4000 cm⁻¹. ... Measurements made for two different laser powers, 2 kW and 4 kW, indicate that the signal grows linearly with the input power.” (p 130, col 2, ln 3-4 and 9-11).

EMER-Raman spectroscopy determines one or more electromagnetic frequencies after photogenerated changes are induced in a molecule (e.g., after the spectral pattern of the enzyme is changed). Thereafter, the Raman spectral pattern of a changed enzyme is used to irradiate an enzyme reaction system, and not the catalytic spectral pattern of the enzyme itself.

Accordingly, this reference is clearly deficient and should be removed as a §102 reference because it does not disclose all elements recited in the claims.

§103 REJECTION—MOHR IN VIEW OF WEBSITE “NATIONAL HIGH MAGNETIC FIELD LABORATORY

This rejection is deficient in that the features of the claimed invention are not disclosed or suggested by the combination of references.

As discussed by Applicants in their previous response, assuming arguendo that the “inert catalyst” of Mohr somewhere fit the traditional and generally understood meaning of catalyst, Mohr teaches that it is desirable to use some frequency related to an electrode material (i.e., an inert electrode material), such frequency being related to some chosen nuclear magnetic resonance (NMR) spectroscopy technique. The frequency absorbed and emitted by a material via NMR varies with the strength of the magnetic field applied to the material. There are thus an infinite number of magnetic field strengths which may be applied to a material, and hence an infinite number of NMR frequencies which may be determined for a material. Mohr does not teach how to determine which of the NMR frequencies, from this infinite range of NMR frequencies, should be applied to any reaction system, including his *inert platinum* electrode hydrolysis system. Instead, Mohr apparently teaches that any frequency, chosen from any NMR reference source relating to platinum, may be applied [Mohr column 1, lines 61-65; column 3, lines 45-47; column 3, lines 58-61; and column 3, line 67 to column 4, line 7]. Mohr thus teaches the indiscriminate and random choice of any NMR frequency (somehow associated with platinum) from an infinite range of NMR frequencies.

Mohr does not connect the disclosed NMR frequencies to actual reaction conditions in his “*inert catalyst*” electrode electrolysis disclosure.

Finally, the use of radio frequency (RF) heating to cause thermodynamic dissociation of materials (radiolysis) was well known in the art at the time of Mohr’s invention. Mohr’s method combines one commonly known method of water dissociation (RF heating/radiolysis of water) with another commonly known method of water dissociation (electrolysis). Mohr discusses that oxygen was present in the water stream at a concentration of 7 mg/L. Upon electrolysis with an unknown electrode material, the oxygen concentration increased 9-14%. With RF heating prior to electrolysis, the oxygen concentration rose 100-185% [see e.g., Mohr, column 5, lines 52-65]. Once again, Mohr does not teach Applicants’ claimed invention nor does he teach to determine, duplicate, and apply the catalyst frequency(ies) disclosed and claimed by Applicants.

Further, the additional references cited do not overcome the deficiencies of Mohr. Accordingly, Applicants respectfully request withdrawal of the §103 rejection based on Mohr.

Applicants respectfully request a personal interview in this application.

Should the Examiner have any questions regarding this communication, the Examiner is invited to telephone Applicants' undersigned representative.

Respectfully submitted,

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